SLIATE

SRI LANKA INSTITUTE OF ADVANCED TECHNOLOGICAL EDUCATION

(Established in the Ministry of Higher Education, vide in Act No. 29 of 1995)

Higher National Diploma in Building Services Engineering
Second Year, Second Semester Examination – 2016
BSE 2204 - Fluid Transfer Devices

Instructions for Candidates:	No. of questions : 05
Answer only **four** questions.	No. of pages : 02
All questions carry equal marks.	Time Allowed : 2 hours

Q1)

(i) What are the main components of a centrifugal pump? (3 marks)

(ii) Write down special construction features of centrifugal pumps. (5 marks)

(iii) In a centrifugal pump diameter at the inlet is 300mm and at the outlet 600 mm. The impeller vanes are set back at an angle of 45^0 to the outer rim. The pump speed is 1300 rpm and the velocity of the flow through the impeller is constant at 5 m/s. Assuming entry of the fluid tin to the pump is radial, Calculate,

(a) Vane angle at the inlet
(b) Work done by water per kilogram of water
(c) Magnitude and the direction of water velocity at the outlet (17 marks)

Q2)

(i) What are the major types of positive displacement pumps? (5 marks)

(ii) Name three designs of external gear pumps. (5 marks)

(iii) How the volumetric efficiency and the mechanical efficiency of positive displacement pumps are determined? (6 marks)

(iv) A gear pump has a 87.2 mm outside diameter and, a 58.2 mm inside diameter and a 28.4 mm width. If the actual pump flow rate is 18.5×10^{-4} m^3/s, at 1800 rpm and the rated pressure, determine the volumetric efficiency. (9 marks)

Q3)

(i) Write down the advantages and disadvantages of a centrifugal pump. (5 marks)

(ii) With the help of a neat sketch, briefly describe the operation of a centrifugal pump. (8 marks)

(iii) With the help of a neat sketch, introduce the main components of an external gear pump and briefly describe its operation. (12 marks)

Q4)

(i) Compare fans, blowers and compressors with reference to specific ratio and the pressure rise. (7 marks)

(ii) Write down the types of fans and briefly explain how air is flowing through them. (6 marks)

(iii) Write down applications of each fan type, that you have written in (ii). (5 marks)

(iv) What are the types of blades found in fans and blowers? Illustrate how their efficiencies differ. (7 marks)

Q5)

(i) What is meant by a multistage compressor? (3 marks)

(ii) Briefly describe the types of compressors used in industry. (7 marks)

(iii) A compressor delivers 30 cfm of air at 90 °F and 125 psi. If the atmospheric temperature and pressure are 70 °F and 14.7 psi, calculate the volume flow rate of air drawn in to the compressor. (7 marks)

(iv) Determine the actual power required in HP to drive the above compressor if the overall efficiency is 0.8. (8 marks)